UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/734,228	12/11/2000	Helmut Lucke	450117-02965	5435

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EXAMINER
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ART UNIT	PAPER NUMBER
2655	

DATE MAILED: 04/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>08 January 2005</u>.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1,2,4-7,9-12 and 14</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-2, 4-7, 9-12 and 14</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some *   c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
        application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Response to Amendment

1.   In response to the Office Action mailed December 21, 2004, applicant submitted

an amendment filed on January 18, 2005, in which the applicant requested

reconsideration with respect to **claim 1**.

Response to Arguments

2.   As per claim 1, applicant argues that method in claim 1 is distinct from Jiang's

method. Specifically applicant teaches "...**(2) *determining* words or combination of**

words, which are consistent with said seed sub-phrase as at least a first

successive sub-phrase which is contained in said received speech phrase, by

inserting additional, paired and/or higher order information, including semantic

and/or pragmatic information, between the sub-phrases, thereby decreasing the

burden of searching...", wherein Jiang teaches the use of N-gram (trigram) model

"that determines the probability of a sequence of words based on the combined

probabilities of three-word segments of the sequence." This is exactly what a N-

gram (trigram in Jiang) model does. It starts out with a word and places additional

words around the original word based on the conditional probabilities of such words

occurring in a sequence. Since the evaluation of conditional probabilities of word-

combinations inherently requires using additional and paired information between words

for determination of conditional probabilities (these probabilities are usually derived from

large word sets and grammar rules), Jiang method reads on claim 1 (column 4, lines 33-

44).

The amended claim 1, wherein the information includes semantic and/or pragmatic information is taught in Jiang where the confidence level is measured. If the confidence measure is below a threshold, the word is identified as likely being erroneous. If the values is above or equal to the threshold, the word is identified as likely to be correct (column 6, lines 38-46 with column 5, lines 28-51).

Therefore, applicant's arguments filed January 8, 2005 have been fully considered but they are not persuasive.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4.   **Claims 1-2, 4-5, 9 and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang et al. (U.S. Patent No. 6,539,353), hereinafter referenced as Jiang in view of Ehsani et al. (U.S. Publication No. 2002/0128821), hereinafter referenced as Ehsani.

As per **claims 1 and 14**, Jiang discloses a method and apparatus for recognizing speech, comprising:

(a) the steps of receiving a speech phrase (100, FIG. 2);

(b) generating a signal being representative to said speech phrase using A/D converter (102, FIG.2);

(c) using feature extractor for pre-processing and storing said signal (104, FIG. 2);

(d) generating from said pre-processed signal at least one series of hypothesis speech elements (Col. 1, line 51-53);

(e) determining at least one series of words being most probable to correspond to said speech phrase by applying a predefined language model to at least said series of hypothesis speech elements (Col. 4, lines 13-16),

wherein the step of determining said series of words further comprises the steps of:

(1) identifying a hypothesis string consisting of sub-word units (Col. 1, lines 52-55) then continuing determining words or combinations of words and which are consistent with said seed sub-phrase as at least a first successive sub-phrase which is contained in said received speech phrase by using and evaluating additional and paired and/or higher order information, including semantic and/or pragmatic information (Col. 6, lines 38-46 with Col. 5, lines 28-51), between the sub-phrases, thereby decreasing the burden of searching (Col. 4, lines 33-44; inherently, N-gram method uses conditional probabilities, which are derived based on additional and paired information), but lacks identifying and extracting word classes of high-perplexity, applying a compiler and merging the sub-word-unit grammars with the remaining low-perplexity part.

Ehsani discloses phrase-based dialogue modeling method for producing a low-perplexity recognition grammar from a conventional grammar by

(a) identifying and extracting word classes (trigram subsumed under the fixed collocation) of high-perplexity (very high perplexity) from the conventional grammar (column 5, paragraphs 0100-0102);

(b) generating a phonetic, phonemic and/or syllabic description (phone models and phonetic dictionary; column 11, paragraph 0217) of high-perplexity word classes (very high perplexity), in particular by applying a sub-word-unit grammar compiler to them (column 11, paragraphs 0211-0214 with column 10, paragraphs 0199-0200), to produce a sub-word-unit grammar for each high-perplexity word class (column5, paragraphs 0100-0102); and

(c) merging sub-word-unit grammars (combining) with remaining low-perplexity part of the conventional grammar to yield said low-perplexity recognition grammar (column 4, paragraphs 0064 with column 6, paragraph 0107), to measure the strength of certain collocations.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Jiang's method wherein it identifies and extracts word classes of high-perplexity, applies a compiler and merges the sub-word-unit grammars with the remaining low-perplexity part, to measure for determining the average branching factor of a recognition network, for evaluating language models (column 5, paragraph 0100).

As per **claim 2**, Jiang et al. disclose the use of a language model (110, FIG. 2) to provide additional information about the set of probabilities that a particular sequence of words will appear in the language of interest (Col. 4, lines 33-44)

As per **claims 4 and 5**, Jiang et al. discloses that language model (110, FIG- 2) is a compact trigram model that determines the probability of sequence of words based on the combined probabilities of three-word segment of the sequence. (Col.4, lines 41-44). Inherently, trigram language models take prepositional relationships of sub-phrases into account when calculating probabilities.

As per **claim 9**, Jiang et al. discloses the use of Hidden Markov Models for estimating probabilities for any sequence of sub-words generated by lexicon (Col. 4, lines 23-30).

5.   **Claims 6-7 and 10-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Jiang in view of Ehsani, as applied to claim 1 above, in further view of Chou et al. (U.S. Patent No. 5,797,123), hereinafter referenced as Chou.

As per **claim 6 and 7**, Jiang in view of Ehsani does not disclose the use of low-perplexity and high-perplexity pads in the system.

Chou teaches limited vocabulary word spotting (low perplexity) with a parallel network of subword models used to model the non-keyword portions of the input utterance (high-perplexity) (Col. 2, lines 61-65). Inherently, sub-word models contain word fragments.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Jiang in combination with Ehsani's method, as taught in Chou, in order to improve the speed of recognition by quickly identifying commonly-used words using low-perplexity vocabulary and then proceeding to identify the less-common words by resorting to more expansive computations.

As per **claim 10**, Jiang in view of Ehsani does not disclose the insertion of high-perplexity word classes into hypothetic graph.

Chou teaches the insertion of functional words and filler phrases into the detection network to improve recognition of key-phrases (Col. 6, lines 47-56).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Jiang in view of Ehsani's method, as taught in Chou, in order to handle repeating speech patterns and thus speed up the search and improve recognition.

As per **claim 11**, Jiang in view of Ehsani do not disclose the removal of candidates from the hypothetical graph.

Chou teaches the merging of the states of the key-phrase network, thus reducing its size (Col. 7, lines 40-46).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Jiang combination with Ehsani's method, as taught in Chou, in order to prune the passed nodes while doing the search through the hypothetical network and thus limit the possibility to accidentally encroach upon the beginning of another phrase.

As per **claim 12,** Jiang in view of Ehsani do not disclose restricting the remaining part of the key-phrase.

Chou teaches placing additional constraints on the search that inhibit impossible connections of key-phrases (Col. 6, lines 64-65).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Jiang in combination with Ehsani's method, as taught in Chou, in order to improve the speed of recognition by quickly removing impossible combinations from the search graph and thus limiting the search space.

Conclusion

6.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7.   Any inquiry concerning this communication or earlier communications from the
examiner should be directed to Jakieda R Jackson whose telephone number is
571.272.7619. The examiner can normally be reached on Monday through Friday from
7:30 a.m. to 5:00p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's
supervisor, David Ometz can be reached on 571.272.7593. The fax phone number for
the organization where this application or proceeding is assigned is 703-872-9306.

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JRJ
April 5, 2005

DAVID L. OMETZ
PRIMARY EXAMINER